

Shortname: OMSO2

Longname: OMI/Aura Sulphur Dioxide (SO2) Total Column 1-Orbit L2 Swath 13x24 km

PFS Version: 1.2.0

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PGE Version: 1.2.0 and later

Lead Algorithm Scientist: Nick Krotkov, Can Li

Lead Algorithm Developer: Can Li

Lead PGE Developer: Can Li

PGE Developer(s): Phil Durbin, Arnold Martin

Description: >

This document specifies the product format for the Version 1.2.0 and subsequent delivery of the OMSO2 L2 PGE, which uses OMT03 L2 measurements to estimate the total column amount of volcanic SO2 (Reference 1) and PCA algorithm to estimate anthropogenic SO2 in the boundary layer(Reference 2). The product is stored as one HDF-EOS 5 swath file for each granule (i.e., one orbit) of OMSO2 L2 data, and has a size range of 20 to 30 Mb.

Global Metadata:

- Metadata Name: AuthorAffiliation

Mandatory: T

Data Type: HE5T\_NATIVE\_CHAR

Number of Values: 1

Range or Valid: Not applicable (free format).

Data Source: PCF

Description: Actual is "GSFC".

- Metadata Name: AuthorName

Mandatory: T

Data Type: HE5T\_NATIVE\_CHAR

Number of Values: 1

Range or Valid: Not applicable (free format).

Data Source: PCF

Description: >

Actual is "Can Li, Joanna Joiner, Nick Krotkov, Pawan Bhartia".

- Metadata Name: GranuleDay

Mandatory: T

Data Type: HE5T\_NATIVE\_INT

Number of Values: 1

Range or Valid: Range is 1 to 31.

Data Source: PGE

Description: >

The day of the month at the start of the granule.

- Metadata Name: GranuleMonth

Mandatory: T

Data Type: HE5T\_NATIVE\_INT

Number of Values: 1

Range or Valid: Range is 1 to 12.

Data Source: PGE

Description: The month at the start of the granule.

- Metadata Name: GranuleYear

Mandatory: T

Data Type: HE5T\_NATIVE\_INT

Number of Values: 1

Range or Valid: Range is 2000 to 2099.

Data Source: PGE

Description: >

The (four-digit) year at the start of the granule.

- Metadata Name: HDFEOSVersion

Mandatory: T

Data Type: HE5T\_NATIVE\_CHAR

Number of Values: 1

Range or Valid: Automatically set by HDF-EOS.

Data Source: HE

Description: Example is "HDFEOS\_5.1.5".

- Metadata Name: InputVersions

Mandatory: T

Data Type: HE5T\_NATIVE\_CHAR

Number of Values: 1

Range or Valid: Not applicable (free format).

Data Source: PGE

Description: >

A list of every ESDT (including version) whose product was used as input for the processing.

- Metadata Name: InstrumentName

Mandatory: T

Data Type: HE5T\_NATIVE\_CHAR

Number of Values: 1

Range or Valid: Valid are "HIRDLS", "MLS", "OMI" and "TES".

Data Source: PCF

Description: Actual is "OMI" (see Section 6.1 of Reference 3).

- Metadata Name: OrbitData

Mandatory: T

Data Type: HE5T\_NATIVE\_CHAR

Number of Values: 1

Range or Valid: Valid are "DEFINITIVE" and "PREDICTED".

Data Source: L1B

Description: >

Indicates whether orbit data used by the L1B processor is definitive or predicted.

- Metadata Name: PGEVERSION

Mandatory: T

Data Type: HE5T\_NATIVE\_CHAR

Number of Values: 1

Range or Valid: Range is "0.0.0" to "9.9.99".

Data Source: PCF

Description: Actual is "1.2.0".

- Metadata Name: ProcessingCenter

Mandatory: T

Data Type: HE5T\_NATIVE\_CHAR

Number of Values: 1

Range or Valid: Not applicable (free format).

Data Source: PCF

Description: Example is "OMIDAPS".

- Metadata Name: ProcessingHost

Mandatory: T

Data Type: HE5T\_NATIVE\_CHAR

Number of Values: 1

Range or Valid: Not applicable (free format).

Data Source: PCF

Description: >

The output from executing the Unix "uname -a" command on the processing machine.

- Metadata Name: ProcessLevel

Mandatory: T

Data Type: HE5T\_NATIVE\_CHAR

Number of Values: 1

Range or Valid: Valid: are "1b", "2" and "3".

Data Source: PCF

Description: Actual is "2".

- Metadata Name: TAI93At0zOfGranule

Mandatory: T

Data Type: HE5T\_NATIVE\_DOUBLE

Number of Values: 1

Range or Valid: Range is 0.0d+00 to 1.0d+30.

Data Source: PGE

Description: >

The TAI93 time at 0z of the granule (see Section 6.1 of Reference 3).

#### Swath Metadata:

- Metadata Name: SwathName

Mandatory: T

Data Type: HE5T\_NATIVE\_CHAR

Number of Values: 1

Range or Valid: Valid is "OMI Total Column Amount SO2".

Data Source: PGE

Description: Actual is "OMI Total Column Amount SO2".

- Metadata Name: VerticalCoordinate

Mandatory: T

Data Type: HE5T\_NATIVE\_CHAR

Number of Values: 1

Range or Valid: >

Valid: Valid are "Pressure", "Altitude", "Potential Temperature",  
"Slant Column" and "Total Column".

Data Source: PGE

Description: >

Actual is "Total Column" (see Section 6.2 of Reference 3).

#### Swath Dimensions:

- Dimension Name: nTimes

Data Type: HE5T\_NATIVE\_INT

Dimension Type: FIXED

Number of Values: 1

Range or Valid: Range is 0 to 9999.

Data Source: L1B

Description: The number of "scan" lines in the swath.

- Dimension Name: nXtrack

Data Type: HE5T\_NATIVE\_INT

Dimension Type: FIXED

Number of Values: 1

Range or Valid: Range is 1 to 60.

Data Source: L1B

Description: The number of ground pixels per "scan" line.

#### Geolocation Fields:

- Field Name: GroundPixelQualityFlags

Data Type: HE5T\_NATIVE\_UINT16

Dimensions: nTimes,nXtrack

Range or Valid: Range is 0 to 65534.

Missing Value: 65535

Offset: 0.0d0

Scale Factor: 1.0d0

Units: NoUnits

Data Source: L1B

Title: "Ground Pixel Quality Flags"

Unique Field Definition: TOMS-OMI-Shared

Description: >

Bits 0 to 3 together contain the land/water flags:

0 - shallow ocean

- 1 - land
- 2 - shallow inland water
- 3 - ocean coastline/lake shoreline
- 4 - ephemeral (intermittent) water
- 5 - deep inland water
- 6 - continental shelf ocean
- 7 - deep ocean
- 8-14 - not used
- 15 - error flag for land/water

Bits 4 to 6 are flags that are set to 0 for FALSE, or 1 for TRUE:

Bit 4 - sun glint possibility flag

Bit 5 - solar eclipse possibility flag

Bit 6 - geolocation error flag

Bit 7 is reserved for future use (currently set to 0).

Bits 8 to 14 together contain the snow/ice flags (based on NISE):

- 0 - snow-free land
- 1-100 - sea ice concentration (percent)
- 101 - permanent ice (Greenland, Antarctica)
- 102 - not used
- 103 - dry snow
- 104 - ocean (NISE-255)
- 105-123 - reserved for future use
- 124 - mixed pixels at coastline (NISE-252)
- 125 - suspect ice value (NISE-253)
- 126 - corners undefined (NISE-254)
- 127 - error

Bit 15 - NISE nearest neighbor filling flag.

(See Section 6.2 of Reference 5 for more details.)

- Field Name: Latitude  
Data Type: HE5T\_NATIVE\_FLOAT  
Dimensions: nTimes,nXtrack  
Range or Valid: Range is -90.0 to 90.0.  
Missing Value: "-0X1P+100 (C language representation)"  
Offset: 0.0d+00  
Scale Factor: 1.0d+00  
Units: deg  
Data Source: L1B  
Title: "Geodetic Latitude"  
Unique Field Definition: TOMS-Aura-Shared  
Description: >  
The geodetic latitude (in deg) at the center of the ground pixel.

- Field Name: Longitude  
Data Type: HE5T\_NATIVE\_FLOAT  
Dimensions: nTimes,nXtrack  
Range or Valid: Range is -180.0 to 180.0.  
Missing Value: "-0X1P+100 (C language representation)"  
Offset: 0.0d+00  
Scale Factor: 1.0d+00  
Units: deg  
Data Source: L1B  
Title: "Geodetic Longitude"  
Unique Field Definition: TOMS-Aura-Shared

Description: >

The geodetic longitude (in deg) at the center of the ground pixel.

- Field Name: RelativeAzimuthAngle  
Data Type: HE5T\_NATIVE\_FLOAT  
Dimensions: nTimes,nXtrack  
Range or Valid: Range is -180.0 to 180.0.  
Missing Value: "-0X1P+100 (C language representation)"  
Offset: 0.0d+00  
Scale Factor: 1.0d+00  
Units: deg(EastofNorth)  
Data Source: L1B

Title: >

"Relative Azimuth Angle (sun + 180 - view)"

Unique Field Definition: TOMS-Aura-Shared

Description: >

The relative (sun + 180 - view) azimuth angle (in deg) at the center of the ground pixel.

- Field Name: SecondsInDay  
Data Type: HE5T\_NATIVE\_FLOAT  
Dimensions: nTimes  
Range or Valid: Range is 0.0 to 86401.0.  
Missing Value: "-0X1P+100 (C language representation)"  
Offset: 0.0d+00  
Scale Factor: 1.0d+00  
Units: s  
Data Source: L1B  
Title: "Seconds after UTC midnight"

Unique Field Definition: TOMS-Aura-Shared

Description: >

The time (in s) after UTC midnight at the start of the "scan".

- Field Name: SolarAzimuthAngle  
Data Type: HE5T\_NATIVE\_FLOAT  
Dimensions: nTimes,nXtrack  
Range or Valid: Range is -180.0 to 180.0.  
Missing Value: "-0X1P+100 (C language representation)"  
Offset: 0.0d+00  
Scale Factor: 1.0d+00  
Units: deg(EastofNorth)  
Data Source: L1B  
Title: "Solar Azimuth Angle"

Unique Field Definition: TOMS-Aura-Shared

Description: >

The solar azimuth angle (in deg) at the center of the ground pixel.

- Field Name: SolarZenithAngle  
Data Type: HE5T\_NATIVE\_FLOAT  
Dimensions: nTimes,nXtrack  
Range or Valid: Range is 0.0 to 180.0.  
Missing Value: "-0X1P+100 (C language representation)"  
Offset: 0.0d+00  
Scale Factor: 1.0d+00  
Units: deg  
Data Source: L1B  
Title: "Solar Zenith Angle"

Unique Field Definition: TOMS-Aura-Shared

Description: >

The solar zenith angle (in deg) at the center of the ground pixel.

- Field Name:           SpacecraftAltitude  
Data Type:             HE5T\_NATIVE\_FLOAT  
Dimensions:            nTimes  
Range or Valid:        Range is 4.0E05 to 9.0E05.  
Missing Value:         "-0X1P+100 (C language representation)"  
Offset:                 0.0d+00  
Scale Factor:           1.0d+00  
Units:                 m  
Data Source:            L1B  
Title:                 "Spacecraft Altitude"  
Unique Field Definition: TOMS-Aura-Shared

Description: >

Height above WGS84 ellipsoid.

- Field Name:           SpacecraftLatitude  
Data Type:             HE5T\_NATIVE\_FLOAT  
Dimensions:            nTimes  
Range or Valid:        Range is -90.0 to 90.0.  
Missing Value:         "-0X1P+100 (C language representation)"  
Offset:                 0.0d+00  
Scale Factor:           1.0d+00  
Units:                 deg  
Data Source:            L1B  
Title:                 "Spacecraft Latitude"  
Unique Field Definition: TOMS-Aura-Shared

Description: >

Geodetic latitude above WGS84 ellipsoid.

- Field Name:           SpacecraftLongitude  
Data Type:             HE5T\_NATIVE\_FLOAT  
Dimensions:            nTimes  
Range or Valid:         Range is -180.0 to 180.0.  
Missing Value:         "-0X1P+100 (C language representation)"  
Offset:                 0.0d+00  
Scale Factor:           1.0d+00  
Units:                  deg  
Data Source:            L1B  
Title:                  "Spacecraft Longitude"  
Unique Field Definition: TOMS-Aura-Shared  
Description: >

Geodetic longitude above WGS84 ellipsoid.

- Field Name:           TerrainHeight  
Data Type:             HE5T\_NATIVE\_INT16  
Dimensions:            nTimes,nXtrack  
Range or Valid:         Range is -100.0 to 10000.0.  
Missing Value:         -32767  
Offset:                 0.0d+00  
Scale Factor:           1.0d+00  
Units:                  m  
Data Source:            L1B  
Title:                  "Terrain Height"  
Unique Field Definition: TOMS-Aura-Shared  
Description: >

The terrain height (in m) at the center of the ground pixel (from

the OMI Level 1B file).

- Field Name: Time  
Data Type: HE5T\_NATIVE\_DOUBLE  
Dimensions: nTimes  
Range or Valid: Range is -5.0D09 to 1.0D10.  
Missing Value: "-0X1P+100 (C language representation)"  
Offset: 0.0d+00  
Scale Factor: 1.0d+00  
Units: s  
Data Source: L1B  
Title: "Time at Start of Scan (TAI93)"  
Unique Field Definition: TOMS-Aura-Shared  
Description: >  
The TAI93 time (in s) at the start of the "scan".

- Field Name: ViewingAzimuthAngle  
Data Type: HE5T\_NATIVE\_FLOAT  
Dimensions: nTimes,nXtrack  
Range or Valid: Range is -180.0 to 180.0.  
Missing Value: "-0X1P+100 (C language representation)"  
Offset: 0.0d+00  
Scale Factor: 1.0d+00  
Units: deg(EastofNorth)  
Data Source: L1B  
Title: "Viewing Azimuth Angle"  
Unique Field Definition: TOMS-Aura-Shared  
Description: >  
The viewing azimuth angle (in deg) at the center of the ground pixel.

- Field Name: ViewingZenithAngle  
Data Type: HE5T\_NATIVE\_FLOAT  
Dimensions: nTimes,nXtrack  
Range or Valid: Range is 0.0 to 70.0.  
Missing Value: "-0X1P+100 (C language representation)"  
Offset: 0.0d+00  
Scale Factor: 1.0d+00  
Units: deg  
Data Source: L1B  
Title: "Viewing Zenith Angle"  
Unique Field Definition: TOMS-Aura-Shared  
Description: >  
The viewing zenith angle (in deg) at the center of the ground pixel.

Data Fields:

- Field Name: AlgorithmFlag\_PBL  
Data Type: HE5T\_NATIVE\_UINT8  
Dimensions: nTimes,nXtrack  
Range or Valid: Range is 0 to 16.  
Missing Value: 255  
Offset: 0.0d+00  
Scale Factor: 1.0d+00  
Units: NoUnits  
Data Source: PGE  
Title: "Algorithm Flag for PBL"  
Unique Field Definition: OMI-Specific  
Description: >

The PBL processing flag for each ground pixel, indicating the algorithm path:

0 - skipped

1 - linear fitting, vertical column SO<sub>2</sub>, short wavelength window

2 - linear fitting, vertical column SO<sub>2</sub>, long wavelength window

Add 10 for snow/ice

- Field Name:           AlgorithmFlag\_TRL  
Data Type:             HE5T\_NATIVE\_UINT8  
Dimensions:            nTimes,nXtrack  
Range or Valid:        Range is 0 to 16.  
Missing Value:         255  
Offset:                0.0d+00  
Scale Factor:          1.0d+00  
Units:                 NoUnits  
Data Source:           PGE  
Title:                 "Algorithm Flag for TRL"

Unique Field Definition: OMI-Specific

Description: >

The TRL processing flag for each ground pixel, indicating the algorithm path:

0 - skipped

1 - linear fitting, vertical column SO<sub>2</sub>, short wavelength window

2 - linear fitting, vertical column SO<sub>2</sub>, long wavelength window

Add 10 for snow/ice

- Field Name:           AlgorithmFlag\_TRM  
Data Type:             HE5T\_NATIVE\_UINT8  
Dimensions:            nTimes,nXtrack  
Range or Valid:        Range is 0 to 16.  
Missing Value:         255

Offset: 0.0d+00  
Scale Factor: 1.0d+00  
Units: NoUnits  
Data Source: PGE  
Title: "Algorithm Flag for TRM"

Unique Field Definition: OMI-Specific

Description: >

The TRM processing flag for each ground pixel, indicating the algorithm path:

0 - skipped

1 - linear fitting, vertical column SO<sub>2</sub>, short wavelength window

2 - linear fitting, vertical column SO<sub>2</sub>, long wavelength window

Add 10 for snow/ice

- Field Name: AlgorithmFlag\_STL  
Data Type: HE5T\_NATIVE\_UINT8  
Dimensions: nTimes,nXtrack  
Range or Valid: Range is 0 to 16.  
Missing Value: 255  
Offset: 0.0d+00  
Scale Factor: 1.0d+00  
Units: NoUnits  
Data Source: PGE  
Title: "Algorithm Flag for STL"

Unique Field Definition: OMI-Specific

Description: >

The STL processing flag for each ground pixel, indicating the algorithm path:

0 - skipped

1 - linear fitting, vertical column SO<sub>2</sub>, short wavelength window

2 - linear fitting, vertical column SO<sub>2</sub>, long wavelength window

Add 10 for snow/ice

- Field Name: ChiSquare  
Data Type: HE5T\_NATIVE\_FLOAT  
Dimensions: nTimes,nXtrack  
Range or Valids: Range is 0 to 100.0.  
Missing Value: "-0X1P+100 (C language representation)"  
Offset: 0.0d+00  
Scale Factor: 1.0d+00  
Units: NoUnits  
Data Source: PGE  
Title: "Chi square of the fitting residuals"  
Unique Field Definition: OMI-Specific  
Description: The Chi square for STL from the linear least square fit.

- Field Name: fc  
Data Type: HE5T\_NATIVE\_FLOAT  
Dimensions: nXtrack,nTimes  
Minimum Value: 0.0  
Maximum Value: 1.0  
Missing Value: -1.2676506e+30  
Offset: 0.0  
Scale Factor: 1.0  
Units: NoUnits  
Data Source: PGE  
Title: MLER Cloud Fraction  
Unique Field Definition: TOMS-OMI-Shared  
Description: The MLER model parameter, effective cloud fraction.

- Field Name: RadiativeCloudFraction  
Data Type: HE5T\_NATIVE\_FLOAT  
Dimensions: nTimes,nXtrack  
Range or Valid: Range is 0 to 1.0.  
Missing Value: "-0X1P+100 (C language representation)"  
Offset: 0.0d+00  
Scale Factor: 1.0d+00  
Units: NoUnits  
Data Source: PGE  
Title: "Effective Cloud Fraction"  
Unique Field Definition: TOMS-OMI-Shared  
Description: The effective cloud fraction.

- Field Name: CloudPressure  
Data Type: HE5T\_NATIVE\_FLOAT  
Dimensions: nXtrack,nTimes  
Range or Valid: Range is 0.0 to 1013.25  
Missing Value: "-0X1P+100 (C language representation)"  
Offset: 0.0d0  
Scale Factor: 1.0d0  
Units: hPa  
Data Source: PGE  
Title: "Radiative Cloud Pressure"  
Unique Field Definition: OMI-Specific  
Description: >  
The effective cloud pressure associated with the ground pixel.

- Field Name: ColumnAmountO3  
Data Type: HE5T\_NATIVE\_FLOAT

Dimensions: nXtrack,nTimes  
Range or Valid: Range is 50.0 to 700.0  
Missing Value: "-0X1P+100 (C language representation)"  
Offset: 0.0d0  
Scale Factor: 1.0d0  
Units: DU  
Data Source: PGE  
Title: "Best Total Ozone Solution"

Unique Field Definition: OMI-Specific

Description: >

The best retrieved total column O3 from OMT03.

- Field Name: deltaO3  
Data Type: HE5T\_NATIVE\_FLOAT  
Dimensions: nXtrack,nTimes  
Range or Valid: Range is -1000.0 to 1000.0  
Missing Value: "-0X1P+100 (C language representation)"  
Offset: 0.0d0  
Scale Factor: 1.0d0  
Units: DU  
Data Source: PGE  
Title: "adjustment to ColumnAmount O3 "

Unique Field Definition: OMI-Specific

Description: >

The ozone adjustment derived from fitting method.

- Field Name: ColumnAmountSO2\_TRL  
Data Type: HE5T\_NATIVE\_FLOAT  
Dimensions: nXtrack,nTimes

Range or Valid: Range is -10.0 to 2000.0  
Missing Value: "-0X1P+100 (C language representation)"  
Offset: 0.0d0  
Scale Factor: 1.0d0  
Units: DU  
Data Source: PGE  
Title: "Vertical Column Amount SO2 (TRL)"

Unique Field Definition: OMI-Specific

Description: >

The retrieved vertical column amount SO2 with a prscribed SO2 profile similar to the standard ozone profile in Umkher layer 0 (roughly between 0 and 5 KM altitude).

- Field Name: ColumnAmountSO2\_TRM  
Data Type: HE5T\_NATIVE\_FLOAT  
Dimensions: nXtrack,nTimes  
Range or Valid: Range is -10.0 to 2000.0  
Missing Value: "-0X1P+100 (C language representation)"  
Offset: 0.0d0  
Scale Factor: 1.0d0  
Units: DU  
Data Source: PGE  
Title: "Vertical Column Amount SO2 (TRM)"

Unique Field Definition: OMI-Specific

Description: >

The retrieved vertical column amount SO2 with a prscribed SO2 profile similar to the standard ozone profile in Umkher layer 1 (roughly between 5 and 10 KM altitude).

- Field Name: ColumnAmountSO2\_TRMbrd  
Data Type: HE5T\_NATIVE\_FLOAT  
Dimensions: nXtrack,nTimes  
Range or Valid: Range is -10.0 to 2000.0  
Missing Value: "-0X1P+100 (C language representation)"  
Offset: 0.0d0  
Scale Factor: 1.0d0  
Units: DU  
Data Source: PGE  
Title: "BRD Vertical Column Amount SO2 (TRM)"

Unique Field Definition: OMI-Specific

Description: >

The retrieved vertical column amount SO2 with a prscribed SO2 profile similar to the standard ozone profile in Umkher layer 1 (roughly between 5 and 10 KM altitude).

- Field Name: ColumnAmountSO2\_STL  
Data Type: HE5T\_NATIVE\_FLOAT  
Dimensions: nXtrack,nTimes  
Range or Valid: Range is -10.0 to 2000.0  
Missing Value: "-0X1P+100 (C language representation)"  
Offset: 0.0d0  
Scale Factor: 1.0d0  
Units: DU  
Data Source: PGE  
Title: "Vertical Column Amount SO2 (STL)"

Unique Field Definition: OMI-Specific

Description: >

The retrieved vertical column amount SO2 with a prscribed SO2 profile

similar to the standard ozone profile in Umkher layer 3 (roughly between 15 and 20 KM altitude).

- Field Name: ColumnAmountSO2\_STLbrd  
Data Type: HE5T\_NATIVE\_FLOAT  
Dimensions: nXtrack,nTimes  
Range or Valid: Range is -10.0 to 2000.0  
Missing Value: "-0X1P+100 (C language representation)"  
Offset: 0.0d0  
Scale Factor: 1.0d0  
Units: DU  
Data Source: PGE  
Title: "BRD Vertical Column Amount SO2 (STL)"

Unique Field Definition: OMI-Specific

Description: >

The retrieved vertical column amount SO2 with a prscribed SO2 profile similar to the standard ozone profile in Umkher layer 3 (roughly between 15 and 20 KM altitude).

- Field Name: ColumnAmountSO2\_PBL  
Data Type: HE5T\_NATIVE\_FLOAT  
Dimensions: nXtrack,nTimes  
Range or Valid: Range is -10.0 to 2000.0  
Missing Value: "-0X1P+100 (C language representation)"  
Offset: 0.0d0  
Scale Factor: 1.0d0  
Units: DU  
Data Source: PGE  
Title: "Vertical Column Amount SO2 (PBL)"

Unique Field Definition: OMI-Specific

Description: >

The retrieved vertical column amount SO<sub>2</sub> with a boundary-layer SO<sub>2</sub> profile averaged from in-situ aircraft measurements over eastern United States.

- Field Name: ColumnAmountSO<sub>2</sub>\_PBLbrd  
Data Type: HE5T\_NATIVE\_FLOAT  
Dimensions: nXtrack,nTimes  
Range or Valid: Range is -10.0 to 2000.0  
Missing Value: "-0X1P+100 (C language representation)"  
Offset: 0.0d0  
Scale Factor: 1.0d0  
Units: DU  
Data Source: PGE  
Title: "BRD Vertical Column Amount SO<sub>2</sub> (PBL)"

Unique Field Definition: OMI-Specific

Description: >

The retrieved vertical column amount SO<sub>2</sub> with a boundary-layer SO<sub>2</sub> profile averaged from in-situ aircraft measurements over eastern United States.

- Field Name: deltaRefl  
Data Type: HE5T\_NATIVE\_FLOAT  
Dimensions: nXtrack,nTimes  
Range or Valid: Range is -1.0 to 1.0  
Missing Value: "-0X1P+100 (C language representation)"  
Offset: 0.0d0  
Scale Factor: 1.0d0

Units: NoUnits

Data Source: PGE

Title: "adjustment to reflectivity at 331nm"

Unique Field Definition: OMI-Specific

Description: >

The reflectivity vs wavelength is described by a second order polynomial,

$R = R331 + c1 * (\lambda - 331) + c2 * (\lambda - 331)^2$ . The deltaRefl is

the reflectivity adjustment to the zero-th order term, R331.

- Field Name: dN\_dSO2\_TRM

Data Type: HE5T\_NATIVE\_FLOAT

Dimensions: nTimes,nXtrack,nWavel

Range or Valid: Range is 0.0 to 10.

Missing Value: "-0X1P+100 (C language representation)"

Offset: 0.0d+00

Scale Factor: 1.0d+00

Units: 1/DU

Data Source: PGE

Title: "Umkehr Layer 1 SO2 Sensitivity Ratio, dN/dSO2"

Unique Field Definition: TOMS-OMI-Shared

Description: Umkehr Layer 1 SO2 sensitivity ratio, dN/dSO2.

- Field Name: dN\_dSO2\_STL

Data Type: HE5T\_NATIVE\_FLOAT

Dimensions: nTimes,nXtrack,nWavel

Range or Valid: Range is 0.0 to 10.

Missing Value: "-0X1P+100 (C language representation)"

Offset: 0.0d+00

Scale Factor: 1.0d+00

Units: 1/DU  
Data Source: PGE  
Title: "Umkehr Layer 3 SO2 Sensitivity Ratio, dN/dSO2"  
Unique Field Definition: TOMS-OMI-Shared  
Description: Umkehr Layer 3 SO2 sensitivity ratio, dN/dSO2.

- Field Name: dN\_dSO2\_TRL  
Data Type: HE5T\_NATIVE\_FLOAT  
Dimensions: nTimes,nXtrack,nWavel  
Range or Valid: Range is 0.0 to 10.  
Missing Value: "-0X1P+100 (C language representation)"  
Offset: 0.0d+00  
Scale Factor: 1.0d+00  
Units: 1/DU

Data Source: PGE  
Title: "Umkehr Layer 0 SO2 Sensitivity Ratio, dN/dSO2"  
Unique Field Definition: TOMS-OMI-Shared  
Description: Umkehr Layer 0 SO2 sensitivity ratio, dN/dSO2.

- Field Name: LayerEfficiency  
Data Type: HE5T\_NATIVE\_FLOAT  
Dimensions: nTimes,nXtrack,nLayers  
Range or Valid: Range is 0.0 to 10.0.  
Missing Value: "-0X1P+100 (C language representation)"  
Offset: 0.0d+00  
Scale Factor: 1.0d+00  
Units: NoUnits  
Data Source: PGE  
Title: "Algorithmic Layer Efficiency"

Unique Field Definition: TOMS-OMI-Shared

Description: The algorithmic layer efficiency.

- Field Name: QualityFlags\_PBL  
Data Type: HE5T\_NATIVE\_UINT16  
Dimensions: nTimes,nXtrack  
Range or Valid: Range is 0 to 65534.  
Missing Value: 65535  
Offset: 0.0d+00  
Scale Factor: 1.0d+00  
Units: NoUnits  
Data Source: PGE  
Title: "Quality Flags for PBL"

Unique Field Definition: OMI-Specific

Description: >

Each bit correspond to a flag that is set to 0 for good value,  
or 1 for bad value:

Bit 0 - SO2 consistency flag (0 for SO2 from 3 pairs are consistent, 1 for not)

Bit 1 - geometric slant O3 column  $\geq$  Threshold (currently set at 1500 D.U.)

Bit 2 - UV Aerosol Index  $> 3$

Bit 3 - Reflectivity at 331 nm  $> 15 \%$

Bit 4 to 6 together represents one number whose value ranging from 0 to 7

- it is equal to the first 4 bits of the OMT03 QualityFalgs.

Bit 7 - Descending

Bit 8 - reflectivity error

Bit 9 - geolocation error

Bit 10 - L1B warning, error, or missing

Bit 11 - set to be same as bit 6 of the OMT03 QualityFalgs

Bit 12 - set to be same as bit 7 of the OMT03 QualityFalgs

Bit 13 - place holder, set to zero currently

Bit 14 - place holder, set to zero currently

Bit 15 - place holder, set to zero currently

- Field Name: QualityFlags\_TRL  
Data Type: HE5T\_NATIVE\_UINT16  
Dimensions: nTimes,nXtrack  
Range or Valid: Range is 0 to 65534.  
Missing Value: 65535  
Offset: 0.0d+00  
Scale Factor: 1.0d+00  
Units: NoUnits  
Data Source: PGE  
Title: "Quality Flags for TRL"

Unique Field Definition: OMI-Specific

Description: >

Each bit correspond to a flag that is set to 0 for good value,  
or 1 for bad value:

Bit 0 - SO2 consistency flag (0 for SO2 from 3 pairs are consistent, 1 for not)

Bit 1 - geometric slant O3 column  $\geq$  Threshold (currently set at 1500 D.U.)

Bit 2 - UV Aerosol Index  $> 3$

Bit 3 - Reflectivity at 331 nm  $> 15\%$

Bit 4 to 6 together represents one number whose value ranging from 0 to 7

- it is equal to the first 4 bits of the OMT03 QualityFalgs.

Bit 7 - Descending

Bit 8 - reflectivity error

Bit 9 - geolocation error

- Bit 10 - L1B warning, error, or missing
- Bit 11 - set to be same as bit 6 of the OMT03 QualityFalgs
- Bit 12 - set to be same as bit 7 of the OMT03 QualityFalgs
- Bit 13 - place holder, set to zero currently
- Bit 14 - place holder, set to zero currently
- Bit 15 - place holder, set to zero currently

- Field Name:           QualityFlags\_TRM  
 Data Type:            HE5T\_NATIVE\_UINT16  
 Dimensions:           nTimes,nXtrack  
 Range or Valid:        Range is 0 to 65534.  
 Missing Value:         65535  
 Offset:                0.0d+00  
 Scale Factor:          1.0d+00  
 Units:                 NoUnits  
 Data Source:           PGE  
 Title:                 "Quality Flags for TRM"

Unique Field Definition: OMI-Specific

Description: >

Each bit correspond to a flag that is set to 0 for good value,  
 or 1 for bad value:

- Bit 0 - SO2 consistency flag (0 for SO2 from 3 pairs are consistent, 1 for not)
- Bit 1 - geometric slant O3 column >= Threshold (currently set at 1500 D.U.)
- Bit 2 - UV Aerosol Index > 3
- Bit 3 - Reflectivity at 331 nm > 15 %
- Bit 4 to 6 together represents one number whose value ranging from 0 to 7
  - it is equal to the first 4 bits of the OMT03 QualityFalgs.
- Bit 7 - Descending

Bit 8 - reflectivity error

Bit 9 - geolocation error

Bit 10 - L1B warning, error, or missing

Bit 11 - set to be same as bit 6 of the OMTO3 QualityFalgs

Bit 12 - set to be same as bit 7 of the OMTO3 QualityFalgs

Bit 13 - place holder, set to zero currently

Bit 14 - place holder, set to zero currently

Bit 15 - place holder, set to zero currently

- Field Name: QualityFlags\_STL

Data Type: HE5T\_NATIVE\_UINT16

Dimensions: nTimes,nXtrack

Range or Valid: Range is 0 to 65534.

Missing Value: 65535

Offset: 0.0d+00

Scale Factor: 1.0d+00

Units: NoUnits

Data Source: PGE

Title: "Quality Flags for STL"

Unique Field Definition: OMI-Specific

Description: >

Each bit correspond to a flag that is set to 0 for good value,

or 1 for bad value:

Bit 0 - SO2 consistency flag (0 for SO2 from 3 pairs are consistent, 1 for not)

Bit 1 - geometric slant O3 column  $\geq$  Threshold (currently set at 1500 D.U.)

Bit 2 - UV Aerosol Index  $> 3$

Bit 3 - Reflectivity at 331 nm  $> 15\%$

Bit 4 to 6 together represents one number whose value ranging from 0 to 7

- it is equal to the first 4 bits of the OMT03 QualityFalgs.

Bit 7 - Descending

Bit 8 - reflectivity error

Bit 9 - geolocation error

Bit 10 - L1B warning, error, or missing

Bit 11 - set to be same as bit 6 of the OMT03 QualityFalgs

Bit 12 - set to be same as bit 7 of the OMT03 QualityFalgs

Bit 13 - place holder, set to zero currently

Bit 14 - place holder, set to zero currently

Bit 15 - place holder, set to zero currently

- Field Name: Rlambda1st  
Data Type: HE5T\_NATIVE\_FLOAT  
Dimensions: nXtrack,nTimes  
Range or Valid: Range is -1.0 to 1.0  
Missing Value: "-0X1P+100 (C language representation)"  
Offset: 0.0d0  
Scale Factor: 1.0d0  
Units: NoUnits  
Data Source: PGE  
Title: "First order term of the R-Lambda function"

Unique Field Definition: OMI-Specific

Description: >

The reflectivity vs wavelength is described by a second order polynomial,  
 $R = R331 + c1*(\lambda - 331) + c2 * (\lambda - 331)^2$ . Rlambda1st is the first order coefficient c1.

- Field Name: Rlambda2nd  
Data Type: HE5T\_NATIVE\_FLOAT

Dimensions: nXtrack,nTimes  
Range or Valid: Range is -1.0 to 1.0  
Missing Value: "-0X1P+100 (C language representation)"  
Offset: 0.0d0  
Scale Factor: 1.0d0  
Units: NoUnits  
Data Source: PGE  
Title: "Second order term of the R-Lambda function"

Unique Field Definition: OMI-Specific

Description: >

The reflectivity vs wavelength is described by a second order polynomial,  
 $R = R_{331} + c_1 * (\lambda - 331) + c_2 * (\lambda - 331)^2$ . Rlambda2nd is the second order coefficient c2.

- Field Name: Reflectivity331  
Data Type: HE5T\_NATIVE\_FLOAT  
Dimensions: nXtrack,nTimes  
Range or Valid: Range is -15.0 to 115.0  
Missing Value: "-0X1P+100 (C language representation)"  
Offset: 0.0d0  
Scale Factor: 1.0d0  
Units: percent  
Data Source: PGE  
Title: "Effective Surface Reflectivity at 331 nm"

Unique Field Definition: OMI-Specific

Description: >

Effective surface reflectivity of the surface at the center of the pixel.

- Field Name: Residual  
Data Type: HE5T\_NATIVE\_FLOAT  
Dimensions: nTimes,nXtrack,nWavel  
Range or Valid: Range is -150.0 to 150.0.  
Missing Value: "-0X1P+100 (C language representation)"  
Offset: 0.0d+00  
Scale Factor: 1.0d+00  
Units: NoUnits  
Data Source: PGE  
Title: "N-Value Residual"  
Unique Field Definition: TOMS-OMI-Shared  
Description: The N-value residual from OMT03.

- Field Name: ResidualAdjustment  
Data Type: HE5T\_NATIVE\_FLOAT  
Dimensions: nTimes,nXtrack,nWavel  
Range or Valid: Range is -50.0 to 50.0.  
Missing Value: "-0X1P+100 (C language representation)"  
Offset: 0.0d+00  
Scale Factor: 1.0d+00  
Units: NoUnits  
Data Source: PGE  
Title: "N-Value Residual Adjustment"  
Unique Field Definition: TOMS-OMI-Shared  
Description: The N-value adjustment made to OMT03 residual.

- Field Name: SO2indexP1  
Data Type: HE5T\_NATIVE\_FLOAT  
Dimensions: nXtrack,nTimes

Range or Valids: Range is -30.0 to 30.0  
Missing Value: "-0X1P+100 (C language representation)"  
Offset: 0.0d0  
Scale Factor: 1.0d0  
Units: NoUnits  
Data Source: PGE  
Title: "Pair 1 SO2 Index"  
Unique Field Definition: OMI-Specific  
Description: >  
The pair 1 (311.9 and 310.8 nm) SO2 Index.

- Field Name: SO2indexP2  
Data Type: HE5T\_NATIVE\_FLOAT  
Dimensions: nXtrack,nTimes  
Range or Valids: Range is -30.0 to 30.0  
Missing Value: "-0X1P+100 (C language representation)"  
Offset: 0.0d0  
Scale Factor: 1.0d0  
Units: NoUnits  
Data Source: PGE  
Title: "Pair 2 SO2 Index"  
Unique Field Definition: OMI-Specific  
Description: >  
The pair 2 (313.2 and 311.9 nm) SO2 Index.

- Field Name: SO2indexP3  
Data Type: HE5T\_NATIVE\_FLOAT  
Dimensions: nXtrack,nTimes  
Range or Valids: Range is -30.0 to 30.0

Missing Value: "-0X1P+100 (C language representation)"

Offset: 0.0d0

Scale Factor: 1.0d0

Units: NoUnits

Data Source: PGE

Title: "Pair 3 SO2 Index"

Unique Field Definition: OMI-Specific

Description: >

The pair 3 (314.4 and 313.2 nm) SO2 Index.

- Field Name: TerrainPressure

Data Type: HE5T\_NATIVE\_FLOAT

Dimensions: nXtrack,nTimes

Range or Valid: Range is 0.0 to 2000.0

Missing Value: "-0X1P+100 (C language representation)"

Offset: 0.0d0

Scale Factor: 1.0d0

Units: hPa

Data Source: PGE

Title: "Terrain Pressure"

Unique Field Definition: OMI-Specific

Description: >

The terrain pressure at the center of the ground pixel.

- Field Name: UVAerosolIndex

Data Type: HE5T\_NATIVE\_FLOAT

Dimensions: nTimes,nXtrack

Range or Valid: Range is -50.0 to 50.0.

Missing Value: "-0X1P+100 (C language representation)"

Offset: 0.0d+00  
Scale Factor: 1.0d+00  
Units: NoUnits  
Data Source: PGE  
Title: "UV Aerosol Index"  
Unique Field Definition: TOMS-OMI-Shared  
Description: >

The UV aerosol index associated with the ground pixel.

Core Metadata:

- Metadata Name: AssociatedInstrumentShortName

Mandatory: T

Data Type: VA20

Number of Values: 1

Range or Valid: Valid is "OMI".

Data Source: MCF

Description: Actual is "OMI".

- Metadata Name: AssociatedPlatformShortName

Mandatory: T

Data Type: VA20

Number of Values: 1

Range or Valid: Valid is "Aura".

Data Source: MCF

Description: Actual is "Aura".

- Metadata Name: AssociatedSensorShortName

Mandatory: T

Data Type: VA20

Number of Values: 1

Range or Valid: Valid are "CCD Ultra Violet" and "CCD Visible".

Data Source: MCF

Description: Actual is "CCD Ultra Violet".

- Metadata Name: AutomaticQualityFlag

Mandatory: T

Data Type: VA64

Number of Values: 1

Range or Valid: Valid are "Passed", "Suspect" and "Failed".

Data Source: PGE

Description: >

A granule-level quality flag that applies generally to the granule and specifically to the parameters at the granule level.

- Metadata Name: AutomaticQualityFlagExplanation

Mandatory: T

Data Type: VA255

Number of Values: 1

Range or Valid: Not applicable (free format).

Data Source: PGE

Description: >

The definitions of "Passed", "Suspect" and "Failed" should go here.

- Metadata Name: DayNightFlag

Mandatory: T

Data Type: VA5

Number of Values: 1

Range or Valid: Valid are "Day", "Night" and "Both".

Data Source: MCF

Description: Actual is "Day".

- Metadata Name: EquatorCrossingDate

Mandatory: T

Data Type: D

Number of Values: 1

Range or Valid: Range is "1995-01-01" to "2099-12-31".

Data Source: L1B

Description: >

The date of the descending equator crossing in the granule.

- Metadata Name: EquatorCrossingLongitude

Mandatory: T

Data Type: LF

Number of Values: 1

Range or Valid: Range is -180.0d0 to 180.0d0.

Data Source: L1B

Description: >

The longitude of the descending equator crossing in the granule.

- Metadata Name: EquatorCrossingTime

Mandatory: T

Data Type: T

Number of Values: 1

Range or Valid: Range is "01:00:0.000000" to "01:59:59.999999".

Data Source: L1B

Description: >

The time of the descending equator crossing in the granule.

- Metadata Name: InputPointer

Mandatory: T

Data Type: VA255

Number of Values: 0 to 10

Range or Valid: >

Valid file names, each in double quotes, separated by commas, all surrounded by curved brackets.

Data Source: PGE

Description: >

A list of the input files used to produce the OMSO2 product.

- Metadata Name: LocalGranuleID

Mandatory: T

Data Type: VA80

Number of Values: 1

Range or Valid: >

Range is

"OMI-Aura\_L2-OMSO2\_1995m0101t0000-o00000\_v001-1995m0101t000000.he5" to

"OMI-Aura\_L2-OMSO2\_2099m1231t2359-o99999\_v999-2099m1231t235959.he5".

Data Source: PGE

Description: >

Example is

"OMI-Aura\_L2-OMSO2\_2002m0630t2354-o21434\_v001-2003m0515t181917.he5"

(see Appendix E of Reference 4).

- Metadata Name: LOCALVERSIONID

Mandatory: T

Data Type: VA60

Number of Values: 1

Range or Valid: >

Valid are "RFC1321 MD5 = not yet calculated" and  
"RFC1321 MD5 = [0-9,a-f]{32}"

Data Source: PCF

Description: >

MD5 fingerprint of the HDF product file.

- Metadata Name: OperationalQualityFlag

Mandatory: T

Data Type: VA20

Number of Values: 1

Range or Valid: >

Valid are "Passed", "Failed", "Being Investigated", "Not Investigated",  
"Inferred Passed", "Inferred Failed" and "Suspect".

Data Source: L1B

Description: >

A granule-level quality flag that applies generally to the granule  
and specifically to the parameters at the granule level.

- Metadata Name: OperationalQualityFlagExplanation

Mandatory: T

Data Type: VA255

Number of Values: 1

Range or Valid: Not applicable (free format).

Data Source: L1B

Description: >

The criteria for setting the OperationalQualityFlag should be stated

here (this Metadata will not appear in the granule).

- Metadata Name: OPERATIONMODE

Mandatory: T

Data Type: VA20

Number of Values: 1

Range or Valid: >

Valid are "Calibration", "Diagnostic", "Initialization", "Launch",  
"Normal", "Roll", "Routine", "Safe", "Solar Calibration", "Standby",  
"Survival" and "Test".

Data Source: PCF

Description: Actual is "Test".

- Metadata Name: OrbitNumber

Mandatory: T

Data Type: I

Number of Values: 1

Range or Valid: Range is 1 to 999999

Data Source: L1B

Description: The OMI orbit number.

- Metadata Name: ParameterName

Mandatory: T

Data Type: VA40

Number of Values: 1

Range or Valid: Valid is "Total Column Sulphur Dioxide".

Data Source: PGE

Description: >

The measured science parameter expressed in the granule.

- Metadata Name: PGEVERSION

Mandatory: T

Data Type: VA10

Number of Values: 1

Range or Valid: Range is "0.0.0" to "9.9.99".

Data Source: PCF

Description: Actual is "1.2.0".

- Metadata Name: ProductionDateTime

Mandatory: T

Data Type: DT

Number of Values: 1

Range or Valid: >

"2003-01-01T00:00:00.000Z" to "2099-12-31T24:59:59.999Z"

Data Source: TK

Description: The date and time of the Level 2 processing.

- Metadata Name: QAPercentCloudCover

Mandatory: T

Data Type: I

Number of Values: 1

Range or Valid: Range is 0 to 100

Data Source: PGE

Description: >

The percent of the data in the granule that have cloud cover.

- Metadata Name: QAPercentInterpolatedData

Mandatory: T

Data Type: I

Number of Values: 1

Range or Valid: Range is 0 to 100

Data Source: PGE

Description: >

The percent of the data in the granule that are interpolated.

- Metadata Name: QAPercentMissingData

Mandatory: T

Data Type: I

Number of Values: 1

Range or Valid: Range is 0 to 100.

Data Source: PGE

Description: >

The percent of the data in the granule that are missing.

- Metadata Name: QAPercentOutOfBoundsData

Mandatory: T

Data Type: I

Number of Values: 1

Range or Valid: Range is 0 to 100.

Data Source: PGE

Description: >

The percent of the data in the granule that are out of bounds data.

- Metadata Name: RangeBeginningDate

Mandatory: T

Data Type: D

Number of Values: 1

Range or Valid: Range is "1995-01-01" to "2099-12-31".

Data Source: L1B

Description: The year, month and day when the granule began.

- Metadata Name: RangeBeginningTime

Mandatory: T

Data Type: T

Number of Values: 1

Range or Valid: Range is "00:00:00.000000" to "23:59:59.999999".

Data Source: L1B

Description: >

The hour, minute, second and fraction of a second when the granule began.

- Metadata Name: RangeEndingDate

Mandatory: T

Data Type: D

Number of Values: 1

Range or Valid: Range is "1995-01-01" to "2099-12-31".

Data Source: L1B

Description: The year, month and day when the granule ended.

- Metadata Name: RangeEndingTime

Mandatory: T

Data Type: T

Number of Values: 1

Range or Valid: Range is "00:00:00.000000" to "23:59:59.999999".

Data Source: L1B

Description: >

The hour, minute, second and fraction of a second when the granule ended.

- Metadata Name: REPROCESSINGACTUAL

Mandatory: T

Data Type: VA20

Number of Values: 1

Range or Valid: >

Valid: "processed 1 time", "processed 2 times", etc...

Data Source: PCF

Description: >

An indication of what reprocessing has been performed on the granule.

- Metadata Name: ReprocessingPlanned

Mandatory: T

Data Type: VA45

Number of Values: 1

Range or Valid: >

Valid: "no further update anticipated", "further update is anticipated" and "further update anticipated using enhanced PGE".

Data Source: DP

Description: Actual is "further update is anticipated".

- Metadata Name: ScienceQualityFlag

Mandatory: T

Data Type: VA20

Number of Values: 1

Range or Valid: >

Valid: "Passed", "Failed", "Being Investigated", "Not Investigated",

"Inferred Passed", "Inferred Failed" and "Suspect".

Data Source: DP

Description: Actual is "Not Investigated".

- Metadata Name: ScienceQualityFlagExplanation

Mandatory: T

Data Type: VA255

Number of Values: 1

Range or Valid: Not applicable (free format).

Data Source: DP

Description: >

An explanation of the criteria used to set the science quality flag should go here.

- Metadata Name: ShortName

Mandatory: T

Data Type: VA8

Number of Values: 1

Range or Valid: Valid is "OMSO2".

Data Source: MCF

Description: Actual is "OMSO2".

- Metadata Name: SizeMBECSDDataGranule

Mandatory: F

Data Type: LF

Number of Values: 1

Range or Valid: Range is 0.00d+00 to 1.00d+04.

Data Source: DSS

Description: >

The volume of data contained in the granule in Mb (this Metadata will not appear in the granule).

- Metadata Name: VersionID

Mandatory: T

Data Type: SI

Number of Values: 1

Range or Valid: Range is 0 to 999.

Data Source: MCF

Description: Actual is 1 for test and pre-launch.

#### Product Specific Attributes:

# - Metadata Name: AverageCloudCover

# Mandatory: T

# Data Type: F

# Number of Values: 1

# Range or Valid: Range is 0.0 to 100.0.

# Data Source: PGE

# Description: >

# Indicates the average cloud cover of the scene.

# - Metadata Name: ClearSceneFlag

# Mandatory: T

# Data Type: VA6

# Number of Values: 1

# Range or Valid: Valid are "clear" and "cloudy".

# Data Source: PGE

# Description: >

# This flag indicates whether the scene is "clear" or "cloudy".

- Metadata Name: EndBlockNr

Mandatory: T

Data Type: SI

Number of Values: 1 to 500

Range or Valid: Range is 1 to 50.

Data Source: L1B

Description: The number of the NOSE end block along the track.

# - Metadata Name: EndPollLatitude

# Mandatory: T

# Data Type: F

# Number of Values: 1

# Range or Valid: Range is -90.0 to 90.0.

# Data Source: PGE

# Description: >

# Indicates the ending bounding latitude of the pollution activity.

# - Metadata Name: EndVolLatitude

# Mandatory: T

# Data Type: F

# Number of Values: 1

# Range or Valid: Range is -90.0 to 90.0.

# Data Source: PGE

# Description: >

# Indicates the ending bounding latitude of the volcanic activity.

# - Metadata Name: ExpeditedData  
# Mandatory: T  
# Data Type: VA10  
# Number of Values: 1  
# Range or Valid: Valid are "TRUE" and "FALSE".  
# Data Source: L1B  
# Description: The indicator for expedited LO data.

# - Metadata Name: ExposureTimes  
# Mandatory: T  
# Data Type: F  
# Number of Values: 1 to 256  
# Range or Valid: Range is 0.0 to 2000.0.  
# Data Source: L1B  
# Description: >  
# An array containing the exposure times in seconds used for the  
# measurements.

# - Metadata Name: InstrumentConfigurationIDs  
# Mandatory: T  
# Data Type: SI  
# Number of Values: 1 to 256  
# Range or Valid: Range is 0 to 255.  
# Data Source: L1B  
# Description: >  
# An array containing the instrument configuration identifiers used  
# for the measurements.

# - Metadata Name: MasterClockPeriods

# Mandatory: T  
# Data Type: F  
# Number of Values: 1 to 128  
# Range or Valid: Range is 0.0 to 10.0.  
# Data Source: L1B  
# Description: >  
# An array containing the master clock periods in seconds used for  
# the measurements.

# - Metadata Name: NrMeasurements  
# Mandatory: T  
# Data Type: I  
# Number of Values: 1  
# Range or Valid: Range is 0 to 9999.  
# Data Source: L1B  
# Description: >  
# The number of measurements in the granule (per output product).

# - Metadata Name: NrSpatialZoom  
# Mandatory: T  
# Data Type: I  
# Number of Values: 1  
# Range or Valid: Range is 0 to 9999.  
# Data Source: L1B  
# Description: The number of measurements in spatial zoom mode.

# - Metadata Name: NrSpectralZoom  
# Mandatory: T  
# Data Type: I

# Number of Values: 1  
# Range or Valid: Range is 0 to 9999.  
# Data Source: L1B  
# Description: The number of measurements in spectral zoom mode.

# - Metadata Name: NrZoom

# Mandatory: T

# Data Type: I

# Number of Values: 1

# Range or Valid: Range is 0 to 9999.

# Data Source: L1B

# Description: The number of measurements in zoom modes.

- Metadata Name: PathNr

Mandatory: T

Data Type: I

Number of Values: 1 to 500

Range or Valid: Range is 1 to 466.

Data Source: L1B

Description: Number of the NOSE path within the repeat cycle.

# - Metadata Name: PollutionActivityFlag

# Mandatory: T

# Data Type: VA4

# Number of Values: 1

# Range or Valid: Valid are "yes" and "none".

# Data Source: PGE

# Description: >

# This flag indicates whether the retrieved total column amount SO2

# indicates pollution activity. Examples are "yes" or "none".

- Metadata Name: SolarEclipse

Mandatory: T

Data Type: VA10

Number of Values: 1

Range or Valid: Valid are "TRUE" and "FALSE".

Data Source: L1B

Description: >

The indicator that during part of the measurements a solar eclipse occurred.

- Metadata Name: SouthAtlanticAnomalyCrossing

Mandatory: T

Data Type: VA10

Number of Values: 1

Range or Valid: Valid are "TRUE" and "FALSE".

Data Source: L1B

Description: >

The indicator that during part of the measurements the spacecraft was in the SAA.

# - Metadata Name: SpacecraftManeuverFlag

# Mandatory: T

# Data Type: VA10

# Number of Values: 1

# Range or Valid: Valid are "TRUE", "FALSE" and "UNKNOWN".

# Data Source: L1B

# Description: >

# The indicator that during part of the measurements the spacecraft  
# was performing a maneuver.

- Metadata Name: StartBlockNr

Mandatory: T

Data Type: SI

Number of Values: 1 to 500

Range or Valid: Range is 1 to 50.

Data Source: L1B

Description: Number of the NOSE start block along the track.

# - Metadata Name: StartPollLatitude

# Mandatory: T

# Data Type: F

# Number of Values: 20

# Range or Valid: Range is -90.0 to 90.0.

# Data Source: PGE

# Description: >

# Indicates the starting bounding latitude of the pollution activity.

# - Metadata Name: StartVolLatitude

# Mandatory: T

# Data Type: F

# Number of Values: 20

# Range or Valid: Range is -90.0 to 90.0.

# Data Source: PGE

# Description: >

# Indicates the starting bounding latitude of the volcanic activity.

# - Metadata Name: VolcanicActivityFlag  
# Mandatory: T  
# Data Type: VA4  
# Number of Values: 1  
# Range or Valid: Valid are "yes" and "none".  
# Data Source: PGE  
# Description: >  
# This flag indicates whether the retrieved total column amount SO2  
# indicates volcanic activity. Examples are "yes" or "none".

#### Archived Metadata:

- Metadata Name: ESDTDescriptorRevision  
Mandatory: T  
Data Type: VA20  
Number of Values: 1  
Range or Valid: Range is "0.0.0" to "9.9.99".  
Data Source: MCF  
Description: >  
This is the version of the ESDT descriptor file as determined by ECS.

- Metadata Name: LongName  
Mandatory: T  
Data Type: VA80  
Number of Values: 1  
Range or Valid: >  
Valid is  
"OMI/Aura Sulphur Dioxide (SO2) Total Column 1-Orbit L2 Swath 13x24 km".

Data Source: MCF

Description: >

Actual is

"OMI/Aura Sulphur Dioxide (SO<sub>2</sub>) Total Column 1-Orbit L2 Swath 13x24 km"

(see Section 7.0 of Reference 3).

References: >

1. "Retrieval of large volcanic SO<sub>2</sub> columns from the Aura Ozone Monitoring Instrument(OMI) comparison and limitations"  
(Yang, K., N.A. Krotkov, A.J. Krueger, S.A. Carn, P.K. Bhartia, P.F. Levelt, J. Geophys. Res., 112, D24S43, doi:10.1029/2007JD008825.OMI, 2007)
2. "A fast and sensitive new satellite SO<sub>2</sub> retrieval algorithm based on principal component analysis Application to the Ozone Monitoring Instrument"  
(Li, C., J. Joiner, N. A. Krotkov, and P. K. Bhartia, Geophys. Res. Lett., 40, doi:10.1002/2013GL058134, 2013).
3. "A File Format for Satellite Atmospheric Chemistry Data Based on Aura File Format Guidelines"  
(Craig, C., Veeffkind, P., Leonard, P., Wagner, P., Vuu, C., and Shepard, D. ESDS-RCF-009, May 2008)
4. "OMI Science Software Delivery Guide for Version 0.9"  
(OMI-SSDG-0.9.9, Version 0.9.9, 21 October 2003)
5. "OMI GDPS Input/Output Data Specification (IODS) Volume 2"  
(OMI-GDPS-IODS-2, SD-OMIE-7200-DS-467, 9 April 2003)

6. "Release 6A Implementation Earth Science Data Model for the ECS Project"

(420-TP-022-002, June 2001)

(<http://edhs1.gsfc.nasa.gov/waisdata/rel6/html/tp4202202.html> and

[http://edhs1.gsfc.nasa.gov/waisdata/rel6/html/tp42022\\_adds.html](http://edhs1.gsfc.nasa.gov/waisdata/rel6/html/tp42022_adds.html))